Zero Retries issue 0129 2023-12-15

Zero Retries is an independent newsletter promoting technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Now in its third year of publication, with 1100+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

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Web version of this issue - https://www.zeroretries.org/p/zero-retries-0129

Request To Send

Commentary by Editor Steve Stroh N8GNJ

Welcome to *Contributing Author* Jeff Davis KE9V

Jeff Davis KE9V is a Zero Retries Pseudostaffer for good reason. Either writing in his blog - KE9V.NET or occasional emails to me, KE9V *regularly* points out Zero Retries Interesting items that I otherwise wouldn't have known about. Such contributions are incredibly valuable to me in making Zero Retries… well… *Zero Retries Interesting!* With *four* distinct items in this issue that were pointed out by KE9V, it was past time to offer KE9V credit as a contributing author, even though he didn't write text specifically to be published in Zero Retries. KE9V's blog was an inspiration for Zero Retries, and he was one of the original subscribers to Zero Retries beginning with **Zero Retries 0000**.

Thanks again Jeff!

Updata

There are a few Updata items in this issue (amplifications) from previous issues of Zero Retries, but one of the biggest oopses was the omission of this key paragraph from **Zero Retries 0128** - What's New at DLARC - 100,000 Items!

> Also new is an archive of selected comments submitted to the Federal Communications Commission via the Electronic Comment Filing System (ECFS) related to ham radio. I'm not going to add all 40,000+ comments ever submitted that mention amateur radio, but I'm trying to cherry pick the best stuff. This little project started when Steve Stroh was looking for Bruce Perens' 2017 comment regarding FCC Docket 17-215, the Technological Advisory Council's inquiry into reforming technical regulations. Steve called the comment "the best rethinking of the

> Amateur Radio regulations that I've seen in the last decade."

That's fixed now in the web version of **Zero Retries 0128**, but Zero Retries email subscribers did not see that paragraph. Apologies to Kay Savetz K6KJN for that omission!

Comments New Milestone - *19 Comments*

Including a few of my own, **Zero Retries 0127** received the most comments of any issue to date - *19!* Not exactly Reddit, but I'm grateful for all that information sharing. See Feedback Loop near the end of this issue for more details.

Rethinking the Paradigm of Amateur Radio Repeaters - Deferred Again

Zero Retries Overfloweth once again, and this article was the one that got punted into (hopefully) the next issue.

73,

Steve N8GNJ

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Communication And Telemetry System (CATS) - Rethinking APRS Paradigms

By Steve Stroh N8GNJ

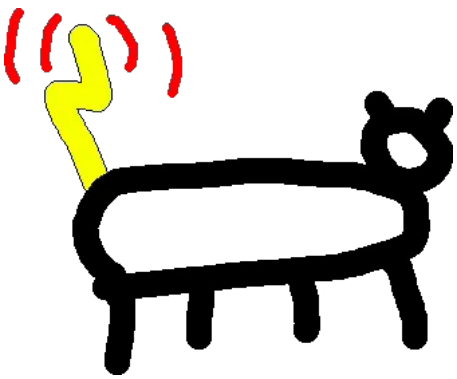

Image courtesy of cats.radio

For a publication that mentions a cat as its Late Night Assistant Editor Emeritus in every issue, the "feline" theme of this project makes me smile.

I think that one of the most compelling recommendations for Amateur Radio is the continuing willingness of Amateur Radio Operators to rethink old radio technology paradigms such as rethinking Automatic Packet Reporting System (APRS)'s paradigms as the Communication and Telemetry System (CATS). ***And then begin experimenting with those new paradigms.***

My thanks to Pseudostaffer Jeff Davis KE9V for this pointer. I was previously unaware of this project.

CATS is a project by Stephen Downward VE9QLE and it was insipired by APRS, but retains, at most, the general idea of transmitting position and other data via radio. There's no compatibility between APRS and CATS, including creating its own Internet server infrastructure, with some compatibility to gate CATS data into the APRS Internet infrastructure:

> At the moment, there's a running FELINET server which gates to and from APRS-IS for backwards-compatibility, as well as an I-Gate and basic mobile transceiver. Packets have been transmitted over the air to the I-Gate, then sent to FELINET and relayed onto APRS-IS.

What intrigued *me* most about CATS is the rethinking of the physical layer - the radio and modulation aspects:

- Raw FSK on the air - APRS is transmitted as AFSK over FM. This is an inefficient encoding technique which leaves a lot of performance on the table. In contrast, CATS uses raw FSK. This alone provides a 12 dB coding advantage.
- Shorter key-up/key-down times - APRS was designed to be used over standard FM radios. These have the disadvantage of very slow PTT times. It's not uncommon for an APRS packet transmission to take less time than keying up and keying down does. As a result, channel utilization suffers greatly. CATS is designed to use cheap FSK transmitters, allowing the standard to enforce very quick PTT times.
- Faster data rate - APRS is typically used at 1200 baud. CATS sets the standard data rate to 9600 baud.
- Forward Error Correction (FEC) - CATS uses LDPC encoding to ensure bit flips don't ruin the packet. Data whitening is used to provide a level of resiliency against burst errors.

- 70cm used by default - Whereas APRS typically uses 2m for RF transmission, CATS uses 70cm. The main advantage of this is that a single antenna can be used for a 2m voice radio and a 70cm CATS transceiver. This is especially useful in mobile installations.

Agree on all points - FSK is better, faster TX / RX switching is better, faster data rate is better, FEC as standard is better, and OK, using 420-450 MHz is probably better as inexpensive (non-FM) radios for that band seem to be more widely available given that 433 MHz is a license-exempt frequency in Europe.

I'm a bit more sanguine about this claim:

> 1W transmit power - With CATS coding gains, this is roughly equivalent to 20W of APRS power.

That VE9QLE seems to already have already designed a radio with these features is impressive, as well as the claim:

> The mobile transceiver will be available for $49 USD, plus shipping. A basic 3D-printed case is included.

And there's a corresponding I-Gate unit with a radio transceiver:

> The I-Gate boards will be available for $24 USD, plus shipping.

The mobile unit is a transceiver, but there's no mention of receive capability / display, only transmit. It's a standalone unit (integated microcontroller) with a navigation satellite receiver, so that accounts for the 2x price of the I-Gate unit (which is designed to work with a Raspberry Pi).

One of the primary use cases that I can envision, given how inexpensive these radios could be, would be a simple text chat system, and exchanging arbitrary text seems to be supported in CATS:

> 9.4 Comment
>
> The comment whisker specifies a textual comment on the CATS packet. The content is an arbitrary byte string. A valid CATS packet may contain zero or more comment whiskers. In this case, their content should be concatenated together. This allows for comments longer than 255 bytes. After concatenation, the result must be valid UTF-8. Note that an individual comment whisker may or may not be valid UTF-8.

Browsing around on the parent site of the Gitlab repository where the details of CATS is hosted, it's obvious that VE9QLE is significantly invested in Amateur Radio (having created "AX26" five years ago) and has tackled a number of other Amateur Radio Projects and other activities.

In my opinion, CATS is a significant project. I will *try* to follow CATS as it evolves, though the only updates available seem to be on Matrix - #cats:crabsin.space, and unfortunately monitoring the various chat systems such as Matrix, Discord, etc. requires a bit too much bandwidth for me.

In a brief email exchange, VE9QLE asked me to include in this article:

> I'm looking to get feedback on the actual utility of the system.
>
> People can pre-order a mobile transceiver or I-gate by emailing me at cats@scd31.com.

He has a few boards available now, and will place a larger order in the near future.

I got *my* reservation sent in within minutes of receiving that email.

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Revisiting Amateur Radio Standards Organization (ARSO)

By Steve Stroh N8GNJ

*In **Zero Retries 0079**, I created the (theoretical, at the moment) organization called Amateur Radio Standards Organization (ARSO), along with a number of other imaginary scenarios. I've periodically revisited that idea, most recently in **Zero Retries 0118** - Standards? Amateur Radio Don't Need No Steenkin' Standards!*

John Kreno N3XKD recently stepped into the fray with his comment in **Zero Retries 0118**:

> I would be interested in applying some of my time and energy in such endeavors (ARETF or ARSO). I'm sure there are others who might also be interested. How do we make that happen?

I replied (minor rewrites for clarity and formatted for publication):

> John - Apologies for this late reply to your comment. I think that the way to get started about ARETF / ARSO is... *to start*. The problem I think that both ARETF and ARSO are trying to solve is that there's no easy / centralized method such as an index or a wiki for someone with a good idea to look and see if it's already been done... *is there prior art*? One recent example I've seen is that there are *three* independent implementations of using small, inexpensive microcontrollers as Packet Radio Modems, and as well-connected as I am, I keep finding additional implementations. Rounding all of those up in one place would be a good start. The steps to implementing ARETF / ARSO would be:
>
> - Create a starting point - website, wiki, Wordpress, etc.
> - Give it a reasonable lifespan - prepay hosting fees, etc. for at least a couple of years.
> - Put a few reference standards up and ask for feedback.

- Try to form a group of likeminded folks.
- Find a group that has a 501(c)(3) that is willing to "pass through" funding should the group obtain a grant.
- Apply for an ARDC grant for funding, such as paying hosting fees for 5, maybe even as long as ten years.
- Lather, rinse, repeat.

One example of standards that need to be gathered is the various Open Source AX.25 stacks. There are implementations in Linux, in JNOS, in Dire Wolf, in every APRS tracker, etc. Make those easy to find if you're creating something new that requires an AX.25 stack so you don't waste time re-inventing an AX.25 stack.

Lastly, while I think that ARETF / ARSO is a good idea and needed, I know myself and my limitations (bandwidth) that I cannot create such a project - the majority of my creative energies and time is now being consumed by Zero Retries. That said, I'd be happy to advise, and contribute (hey, look at this, yet *another* open source AX.25 stack...).

John, Thanks VERY much for seriously considering implementing this idea. I think it's really needed in Amateur Radio now that much... *most*... of the technological innovation in Amateur Radio is now being done in the Software realm.

Late update:

Here's a perfect example of a good / needed use of ARETF / ARSO - Improved Layer 2 Protocol (IL2P) Forward Error Correction (FEC). It was originally implemented in the NinoTNC, was added into Dire Wolf Software TNC, and it will be used on the forthcoming MMDVM-TNC. The latter two are independent implementations (with some help from the author) made possible because of a well-written specification document. Amateur Radio data communications has long suffered from lack of Forward Error Correction, and now IL2P is available as open source, and we should make it as easy as possible to incorporate it in any new data communications system in Amateur Radio.

Yet another example, along with the examples previously cited, of the utility of something like ARSO is that with the emergence of CATS (see previous article), by my count, there are now *at least* four somewhat incompatible APRS-like systems in use for Amateur Radio and hobbyist radio activities:

- APRS, of course, now (theoretically) being ~~governed~~, ~~guided~~, "lightly steered" by the new APRS Foundation. (Hey APRSF Board - let's *hear something* from you about how it's going.)
- OpenTRAC, inspired by APRS, but incompatible with APRS on the protocol level. Now that Bob Bruninga WB4APR's (Silent Keyboard) "Velvet Czar" influence has lapsed, there seems to be some interest in revisiting OpenTRAC (discussed in **Zero Retries 0111** - Revisiting the APRS Foundation). I'm guessing that OpenTRAC has actually been quietly implemented, but just not openly discussed because historically there was much angst about "splintering" the APRS "standard".
- APRS Over LoRa, also inspired by APRS, but also incompatible. Same protocol (I think…), but completely different physical layer so non-interoperable. Also there's a LoRa APRS iGate which can be built from *"very cheep hardware"* 😆. There's a lot to recommend LoRa for this application especially in Europe where 433 MHz is license-exempt.
- Communication And Telemetry System (CATS) - see article above. Unique protocol, unique physical layer, and unique linking network.
- APRS Over WSPR - Especially useful for experimental / amateur balloon telemetry via HF.
- ~~I'll guess that there are…~~ There seem to be implementations of APRS on the Multi-Use Radio Service (MURS) frequencies. MURS is a group of five license-exempt VHF frequencies that (unlike GMRS and FRS) specifically allows data communications.

I'm not arguing that these widely varying implementations of the same basic idea are a bad thing! They all have valid use cases.

With the recent emergence of CATS, these various implementations of "APRS" are a convenient example of the value of an organization such as ARSO. It's my observation that creating an organization like ARSO would be a significant benefit to Amateur Radio. ARSO could be a centralized information source, to provide tracking of the various implementations of "APRS" (and many other technologies) for future developers. Such a centralized information source can provide pointers to each implementation, and provide a framework *to work out interoperability / compatibility issues when that's desired and / or useful*. Mostly… if an organization like ARSO did exist, it could (again, theoretically) prevent wasted time and (unnecessary, undesireable) lack of interoperability and compatibility within Amateur Radio.

I had previously thought that a good "umbrella organization" for ARSO would be ARDC, but it's become obvious that ARDC is wholly occupied with its grants activity and its activities with 44Net.

I now think that an ideal "umbrella organization" for ARSO (as an activity / sub-group if it's determined that an independent organization isn't feasible) would be TAPR. There's history for TAPR doing so with TAPR's involvement with creating and improving AX.25, and TAPR's involvement in creating the APRS Protocol Reference1.

Proposal for a Geostationary Microwave Amateur Radio Payload

By Steve Stroh N8GNJ

Commentary on, and excerpts from a joint paper by AMSAT-UK, British Amateur Television Club (BATC), AMSAT-NA, members of the UK Microwave Group, and Martin Ling M0LNG for a potential Amateur Radio payload (or satellite) in Geosynchronous Earth Orbit to cover portions of Europe and Canada.

This is an excellent 19-page paper walking through the various aspects of some basic recommendations that were / will be made to European Space Agency (ESA) in response to a recent presentation - Geostationary Microwave Amateur Payload Proposal by Frank Zeppenfeldt PD0AP.

One of the most interesting aspects is the intent to cover at least some of Canada because Canada is a member country of ESA. There are three Geosynchronous Earth Orbit slots suggested, and there will have to be a balance in covering the population of Europe versus the population of Canada:

> Although the longitude selected for the mission will primarily depend on the availability of a suitable partner and launch, it is worth comparing the populations of Europe and Canada.
>
> Europe, as a whole, has a population of 742 million while the table below shows Canada has 39 million inhabitants. It can be shown from population distribution, that **it is possible to provide a service to 67% of the Canadian population who live within 31% of the total land area.**

This was made more understandable by a coincidental article in Atlas Obscura showing a graphic that 70% of Canada's population live in the area of Canada immediately North of the Great Lakes.

From my inexpert perspective, it looks like the two most realistic orbital slots to cover the largest "ESA service area" will provide access to, at most, the Eastern half of Canada (as well as the Eastern half of the US), and to all of South America. Oh well, maybe next time for those of us in Western Canada and Western US.

The remainder of the paper discussed the technical aspects of the choice of frequencies, generally a 5.6 GHz uplink and a 10 GHz downlink. There would be a narrowband (250 kHz) uplink channel and a wideband (1 MHz) uplink channel. Onboard regeneration is under consideration, not just bent-pipe as has been the usual practice for Amateur Radio satellites, and consideration of using a Software Defined Radio system onboard to be able use digital techniques for higher reliability of uplinks and downlinks. Other Amateur Radio microwave bands are under consideration, as well as a laser transmitter (aimed at Europe), and an onboard camera.

A paper by Martin Ling M0LNG - **Beyond the Bent Pipe; Lowering barriers and supporting innovation through a mixed-signal transponder architecture** was included. From my inexpert perspective, M0LNG makes a compelling case for inclusion of a software defined radio system to enable use of digital signals and onboard regeneration, arguing that "reliable analog / bent pipe transponder" versus "experimental digital that enables onboard regeneration" isn't necessarily mutually exclusive.

> **Conclusion**
>
> Returning to Frank's question for a GEO payload: Analog, digital or complete on-board SDR?
>
> I argue that there is no need to choose: all of the above, please! These capabilities can be combined in a way that is flexible, fail-safe and which builds on proven transponder designs.
>
> Putting a programmable SDR platform in orbit would provide an accessible and exciting testbed to support innovation in satellite communications. Such a platform would also enable the implementation of new satellite assisted digital modes, that could reduce link budget requirements and lower the barriers to participation for users.
>
> Although it is possible to implement limited versions of these ideas on a cubesat scale, a new GEO payload offers a unique chance to deploy a much more capable and accessible platform.
>
> We should make the most of this rare opportunity.

It's very early days - a potential satellite host hasn't been identified, there's no budget, schedule, or funding source yet identified. Yet, with the resources of the ESA at least interested in the possibility of providing another Amateur Radio GEO payload / satellite, overall, this looks promising and interesting.

Geo! **GEO!** ***GEO!***

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Comments to FCC On Revisions to VHF / UHF Bands Due 2024-01-08

By Steve Stroh N8GNJ

Per ARRL, comments are due 2024-01-08, replies to comments are due 2024-01-22.

ARRL - Bandwidth Limits Replace Symbol Rates on the HF Bands, Other Bands Open for Comment:

> The FCC also requested comment on removing similar symbol rate restrictions in the rules governing 135.7 - 137.8 kHz (2200-meter band), 472 - 479 kHz (630-meter band), and the very high-frequency (VHF) and ultra-high frequency (UHF) bands.
>
> The VHF bands with baud rates are the 6-meter band, 2-meter band, and the 1.25-meter band. The single UHF band with a baud rate is the 70-centimeter band (420 - 450 MHz). The Further Notice of Proposed Rule Making (FNPRM) proposes to maintain the existing bandwidth limits in the Commission's rules for these VHF and UHF bands but seeks comment on whether they should be kept, and if so, whether the bandwidths should be changed. The Commission also sought comment on whether bandwidth limits should be adopted for application to the 2200 and 630-meter bands, and if so, what an appropriate bandwidth limit would be.
>
> Public comments on these additional issues are sought in the FNPRM. The comment period is open until January 8, 2024. Replies to comments are due no later than January 22, 2024. If changes are later adopted, the rules will go into effect in the same manner as they did for the other bands -- after notice and publication in the *Federal Register*.

*As of date of publication of this issue, there are **24 days left to comment**. Perhaps some guidance from ARRL or others will be forthcoming as "there's plenty of time". But as of this issue of Zero Retries, we're days away from the Christmas and New Year holiday period, thus getting comments in could end up "out of mind". That is why I'm highlighting this **now**.*

Up front, I'm certainly no scholar of the workings of the FCC. Very few of us Amateur Radio Operators are, and thus it seems to me that the ARRL should be providing some guidance to do so. But, as you can see from the above excerpt, they are not (yet) doing so. To date, on this issue, ARRL has only provided the *barest of information* about next steps - the cutoff date for comments, and the cutoff date for replies to comments.

I'm confused as to how those dates are arrived at. They're not stated in the Federal Register document that ARRL links to as "Comments and Reply Comments are due by….". But the comment cutoff date as stated by the ARRL is the same as:

> **DATES:**
> Effective January 8, 2024.

And, the replies to comments being due 2024-01-22 is fourteen days later.

I can only conclude that those dates / periods are "norms" for commenting to the FCC.

Now that the dates are established, I confess that I'm uncertain, exactly, *how* to comment. With previous issues that the ARRL wanted to "rouse the masses" to comment on Amateur Radio issues being considered by the FCC, they provided good instructions and an example comment letter with the form that is expected by the FCC for such comments.

In my opinion, this (pending) issue is the most consequential change to Amateur Radio that would serve to encourage experimentation with radio technology. *Thus, it's critical to provide the FCC with substantive, informed comments.*

So, doing some research, I found:

FCC Consumer Guide - How to Comment on FCC Proceedings

> **Submitting Comments**
>
> When submitting comments to the FCC, be aware that:
>
> - Comments should include your name.
> - You must include the docket number or rulemaking number of the proceeding for the corresponding comment. The docket number or rulemaking number of the proceeding can be found on the first page of the FCC document or Public Notice opening the proceeding.
> - You can file a comment both electronically and in paper format.
>   - Electronic comments must be filed by midnight Eastern Time on the date of the comment deadline.
>   - Written comments must be filed by 7p.m. ET on the date of the comment deadline.
> - Comments you submit to the FCC will be made public.
>
> **E-Filing Address:**
>
> (Available for Docketed/Rulemaking Filings Only)
> Comments filed through the Electronic Comment Filing System (ECFS) can be sent as an electronic file via the Internet to ECFS. To get filing instructions for e-mail comments, commenters should send an e-mail to ecfs@fcc.gov and should include the following words in the body of the message: "get form" and your e-mail address. A sample form and directions will be sent in reply.

My experience is that the link to "Electronic Comment Filing System" (https://drupal7admin.fcc.gov/ecfs) *timed out*. And sending the email as instructed (using two different email hosts) *did not result in a reply*. I begin to understand why the "communications law professionals" seem to prefer the paper process outlined in the article to submit their comments as there's some surety with physical (paper) processes.

Doing another search for "fcc electronic comment filing system" I found:

ECFS - Submit Standard Filing (https://www.fcc.gov/ecfs/filings/standard)

Which is a web form for electronically submitting an electronic document directly to the FCC. This web form now seems familiar to me from previous comments that I've submitted.

Note that "ECFS - Submit Standard Filing" is not a "fill in the blanks form" for your comments - *you will have to compose an electronic document and then attach that document in the web form*, along with the required metadata (your name, email, docket / rulemaking numbers, etc.). *This web form* seems like the best method to submit comments to the FCC.

Next Steps:

- Compose your comments in an electronic document. The docket / rulemaking number seems to be:
  WT Docket No. 16-239

  FCC 23-93

  FR ID 188673
- Save the document into one of the allowed formats:
  .docx, .doc, .pdf, .xlsx, .xls, .txt, .pptx, .ppt, .rtf
  (I strongly recommend exporting your document as a PDF file as that will preserve your formatting and overall style.
- Go to **ECFS - Submit Standard Filing (https://www.fcc.gov/ecfs/filings/standard)** and answer the questions on the "Submit Standard Filing" web form and upload your document by the required date - Monday 2024-01-08 before Midnight Eastern Time.

From previous FCC commenting I've done, "gamesmanship norms" by many commenters is to file comments at the last possible day (if not the last possible hour) to avoid "tipping your hand" to those that would write opposing reply comments. In my opinion, that's an immature approach. I'll be submitting my comments next week, well in advance of the deadline.

Remember that the FCC is *only requesting comments on two technical issues*:

- Removing the remaining symbol rate restrictions on Amateur Radio bands that still have them:
    - 2200 Meters (135.7 - 137.8 kHz)
    - 630 Meters (472 - 479 kHz)
    - 6 Meters (50 - 54 MHz)
    - 2 Meters (144 - 148 MHz)
    - 1.25 Meters (222 - 225 MHz)
    - 70 Centimeters (420 - 450 MHz)
- Changing the existing bandwidth limitations on these bands.

My thoughts and broad recommendations on these issues were outlined in **Zero Retries 0125** - Next Up - Removing Symbol Rate Limitations on the US Amateur Radio VHF and UHF Bands; the FCC Requests Comments.

The most notable thought / recommendation of mine is that bandwidth limitation for 70 Centimeters should be changed from maximum of 100 kHz to:

- No bandwidth limitation, or
- Maximum of 6 MHz bandwidth, which codifies existing practice of 6 MHz channels used for analog television), or
- Maximum of 1.4 MHz bandwidth which will allow for experimentation with Long-Term Evolution mobile telephony technology, which requires minimum 1.4 MHz channels.

Now to codify those thoughts into a document suitable for formal comment to the FCC.

I will share my document as a special issue of Zero Retries as soon as it is ready.

Then, we wait for 2024-01-08 to begin the 14-day window of being able to submit *reply* comments (replies to submitted comments).

Leave a comment

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Build Notes From AREDN Nightly Build 20231210

By Pseudostaffer Orv Beach W6BI

Posted on various AREDN mailing lists:

AREDN nightly build 20231210 is now available. Because the AREDN development process has been frozen for almost two months, there are many changes in this first nightly build after the production release. But a significant percentage of them are internal housekeeping (updated packages, etc.) Most of those are omitted from this list, because they're not of interest to the end user. If you're really interested, you can view the entire list on AREDN's GitHub.

This build is based on the latest OpenWrt release. That, plus the many updates and changes, means the usual caveat applies - don't put this code on any node you can't reach easily!

The interesting stuff:

FIXES

- Fixed a flash write problem on Ubiquiti devices
- No longer ping non-routable nodes
- Reverted Mikrotik NAND sysupgrade system - OpenWRT doesnt really support Mikrotik NAND devices after 2019 and the new support appeared broken. So reverted to the 2022 mechanism which does work and avoids upgrade problems.
- Fixed radio count when there are no radios
- Fixed a visual lat/lon setting bug
- Fixed WAN static setup after using advanced network
- dd-wrt firmware updated for Ubiquiti devices (fixes WiFi scan for newer Ubiquiti products)

ENHANCEMENTS

- Use new SSL patch - updated SSL protocols
- Simplified the way we measure link ping times
- The "Save Changes" button now also saves the location data
- Added geo location fallback to the location/map system. The map feature on the setup page can’t get your location anymore because that’s https

only. A fallback has been added which attempts to work out where you are by asking the internet if it's available (so ip based) .

- Now automatically update the permpkg list when we upgrade
- Added Wireguard tunnel support
- If you paste a tunnel config into any field, it will now auto-populate all fields correctly: using the email button on the tunnels page generates configuration text to send people. If you copy all the text and then paste it into any of the client fields, it will work out the right bits and populate all the fields correctly, saving you having to type in each bit yourself. Which especially with wireguard keys, is a bit of a pain
- Added reverse dns lookup capability for supernode tunnels
- Added support for remote syslogging in Advanced Configuration
- Fixed 10 MHz channel bandwidth for Ubiquiti AC devices (5 MHz may work; hasn't been tested)
- Now show frequency range on status page to help with possibly overlapping channels
- Added azimuth, elevation and antenna information. Now nodes with internal antennas will show them. Support for external antenna selection has been added. (antenna inventory is not complete) Now allow heading and height AGL to be specified.
- Converted OLSR wifi broadcasts to unicast. OLSR works by broadcasting state information to its neighbors. However, wifi uses a very different mechanism to broadcast messages compared to unicast. Unicast is more sophisticated (using RTS/CTS, ACK timeouts, retries, etc.) to better get the messages through. But because OLSR used wifi broadcast messages to measure how good a link is, it wasn't actually measuring the same thing. Impact: ETX values will be more accurate. Unknown if they will appear to be better or worse.

NEW DEVICES

- Added Nanobeam 2AC (2.4GHz) device.
- Added GL.iNet B1300 (20 MHz channels only)
- Added GL.iNET Beryl MT1300 (20 MHz channels only)

[You would think the AREDN developers would have slowed down a bit since their most recent production release… but obviously not. Kudos! - Editor]

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

RadioMail 1.3 - The "VARA gets a nanny" Release

Georges Auberger WH6AZ on radiomail.app:

> I am happy to announce the release of RadioMail 1.3 aka the "VARA gets a nanny" release. Available now in the App Store.
>
> **Delivering a Streamlined VARA Experience**
>
> As many of you know, VARA is a type of radio software modem that is used for transmitting and receiving digital data over amateur radio. RadioMail interfaces via TCP/IP with such software modem to connect to stations using the VARA protocol. The VARA software modem listens on two ports for commands and data payload.
>
> Using a network protocol like TCP/IP enables the software modem to run on a radio-connected computer, while applications such as RadioMail can operate on a separate device, anywhere on the network. However, since VARA wasn't designed to function as a service, this setup comes with certain limitations, particularly when you don't have mouse, keyboard or display access to the remote computer.
>
> In order to allow for VARA to run on a headless computer, its lifecycle and configuration needs to be manageable entirely remotely.
>
> Introducing varanny, a command line helper tool that steps in to address these limitations, acting as a 'nanny' for VARA. It offers the following capabilities:
>
> - Service Announcement for Zeroconf
> - Remote Management
> - Multiple VARA Configurations
> - Audio Level Monitor
> - CAT Control Management

In my opinion, implementing "varanny" on a host computer, and then putting the requisite hooks into the RadioMail app is a "tight feedback loop" and is an impressive accomplishment.

Instead of needing to run a "heavy" app on a Windows computer, or even remote control of the "VARA Windows computer", being able to send email on a "clean, light app" such as RadioMail will be attractive. In theory, this approach could be extended to many other "back end systems" besides VARA.

Two Prominent Mentions of Amateur Radio as Educational Outreach

NASA - Inspiring Students with Ham Radio, Other Educational Programs

> As an orbiting microgravity laboratory, the International Space Station hosts experiments from almost every scientific field. It also is home to educational programs to encourage young people worldwide to study science, technology, engineering, and mathematics (STEM). These programs aim to inspire the next generation of space scientists and explorers and experts who can solve problems facing people on Earth.
>
> The first and longest running educational outreach program on the space station is ISS Ham Radio. An organization known as Amateur Radio on the International Space Station, or ARISS, helps run the program. ARISS is a partnership between NASA, the American Radio Relay League, the Radio Amateur Satellite Corporation, amateur radio organizations, and multiple international space agencies. Students use amateur or ham radio to talk with astronauts, asking them questions about life in space, career opportunities, and other space-related topics. Three contacts with schools in Australia and Canada were scheduled during the month of November 2023.

I had not realized that Amateur Radio / ARISS was *the longest running* educational outreach on the ISS. That is… *very cool*!

My thanks to **Amateur Radio Weekly** for mentioning this item.

…

Television Station WNEP (Moosic, Pennsylvania, USA) - Antenna goes up for student-run HAM radio station at University of Scranton

> **The new antenna was installed to help students learn more about radio waves and their connection to the atmosphere and space ahead of a research project.**
>
> SCRANTON, Pa. — A crane helped put a new antenna and tower into place on top of the Loyola Science Center at the University of Scranton with some excited onlookers nearby.
>
> "We're going to get some valuable information, and a lot of other people are excited about it, so it gets us excited too," said Thomas Pisano, a junior at the university.
>
> Dr. Nathaniel Frissell is an assistant professor of physics and engineering at the university and says this antenna will put a student-run HAM radio station online. Dr. Frissell says HAM radios can connect you with people all around the world with its special radio waves.
>
> "These signals, when they leave the antenna, they don't just go straight where you can see it, they'll actually go up to the upper atmosphere, and they'll be reflected back down to Earth, and then it can hop multiple times," said Dr. Frissell.
>
> There is also science behind those signals, and they can be affected by the atmosphere and weather in space. Dr. Frissell's project to bring this station to the university was one of five chosen as a part of a Citizens Science Project with NASA.
>
> "We're working on figuring out how we can use it to support knowledge of space weather and advanced science as well," said Dr. Frissell.
>
> Several students and volunteers from other states came to watch the tower go up. They all took part in a previous study during the annular eclipse last month and are looking forward to how much more data they can collect from it.
>
> "And this is an antenna that lets you hear things. You need this big of an antenna and this type of a tower in order to be able to have the sensitivity to see the small changes that we're interested in studying," said Steve Cerwin of Texas.
>
> "We didn't get to see much with the annular the way the rotation was in the cloud. So this one, I'm excited to get better data with this will have better equipment, and maybe we'll be able to see something," said Pisano.
>
> The total solar eclipse will happen next spring on April 8th, and these scientists and students will be ready for it.

This was a 2:19 video segment on this station's news program. Unlike most "civilian" coverage of Amateur Radio (usually with a humorous slant), this one was informative, detailed, and accurate. It also conveyed excitement about Amateur Radio and that what this activity was actively contributing to scientific research, and was well-supported (in part) by a National Science Foundation grant

My thanks to Merideth Stroh KK7BKI for mentioning this item.

Jason Rausch K4APR Elected New Director of TAPR

From TAPR:

> A Board of Directors election was held during the annual membership meeting on the evening of December 9, 2023 (EST). Jason Rausch, K4APR, was newly elected to the board and will serve his first three-year term, which ends in 2026. Darryl Smith, VK2TDS, and Stana Horzepa, WA1LOU, were re-elected to the board. Both are serving their eighth term as board members having been originally elected in 2002.
>
> K4APR replaces Steve Bible, N7HPR, who decided not to run for reelection after serving nine terms on the board.

Steve Bible N7HPR has served TAPR well over the years… *decades*… and kudos to him for deciding to take a break from TAPR leadership and make room for some new perspective. I hope there are more such changes to the Board in future elections.

Congrats to K4APR in injecting some new perspective and energy into TAPR leadership. I hope the other TAPR Board members are *willing to listen* to K4APR's experience and perspective and *don't* try to "indoctrinate" K4APR into the current TAPR paradigm. It will be interesting to see if TAPR takes

some lessons from K4APR's perspective as a individual creator of Amateur Radio products where he has been able to design, produce, sell, and support his products, solo, and on a part time basis.

K4APR is a busy person in Amateur Radio as he's also on the leadership of the new APRS Foundation, and he's busy with RPC Electronics, building and shipping the new SMT TARPN NinoTNC2.

Open Research Institute RFBitBanger Batch 2 Kit is Available Now

> An Easy to Build Kit that makes a great gift.
>
> Open Source Hardware and Software includes the SCAMP digital text mode.
>
> This HF QRP Digital Radio also supports FT8.

More details and purchase link.

Radio-Kits Explorer QRP Transceiver Kit

Image courtesy of Radio-Kits

Pseudostaffer Jeff Davis KE9V:

> Coming soon, a NEW QRP CW/SSB kit. The **Explorer QRP Transceiver** kit from Radio-Kits in the UK is the successor to the MKARS80 which was originally developed as a club project for the Milton Keynes Amateur Radio Society. Adopted by many clubs as a project and purchased by amateurs around the world. Approximately 1500 were sold over a 15-year period, sales brought to an end by component obsolescence. The NEW kit can be built for 20, 40 or 80 meters. Doesn't appear to be available just yet, and I haven't seen a price. Click for more information.

It's impressive that this "simple" radio has implemented CAT Control via USB. I remain interested by "simple" (though this unit has *lots* of discrete components) low power, low cost HF radios like this and the RFBitBanger (and many others) for the potential of various new (and ever evolving) data modes that can overcome the vagaries on HF of variable propagation, low power, and basic (and sometimes compromised) antennas. I think it would be very cool to have essentially an "text intercom" function via HF that "just works". HF is on my priority list for 2024.

ZachTech WSPR Desktop Transmitter

Continuing the theme of low power, low cost, Zero Retries Interesting HF radios, is this item, also from Pseudostaffer Jeff Davis KE9V:

> The WSPR Desktop transmitter is a standalone multi-band WSPR transmitter with built in GPS for the radio amateur/experimenter.
>
> Some quick features:
>
> 1. Standalone operation, PC required for configuration but not for operation.
> 2. For transmission on a variety of HF Bands (2-5), based on model and user-choice.
> 3. Is powered from USB.
> 4. Comes with built-in GPS module and includes external GPS antenna with a 3m (10feet) long cable for easy installation.
> 5. Use the PC configuration software to set up your call-sign and band-choice and after that it can operate in standalone mode.
> 6. Timing and Maidenhead position is automatic from the GPS network. Take it camping, move it to another QTH, use it mobile. Needs only 5V 250mA so can be powered from a phone charger or USB power pack.
> 7. Contains an Arduino with open source software. Software and Schematic is published on documentation page.
> 8. Available in three models.
>   1. Model 2190To80 for bands 2190m, 630m, 160m and 80m (136kHz, 474kHz, 1.8MHz and 3.5MHz)
>   2. Model 80To10 for bands 80m, 40m, 30m, 20m, 17m, 15m, 12m and 10m (3.5MHz, 7MHz, 10MHz, 14MHz, 18MHz, 21MHz, 24MHz and 28MHz)
>   3. Model 40To6 for bands 40m, 30m, 20m, 17m, 15m, 12m, 10 and 6m (7MHz, 10MHz, 14MHz, 18MHz, 21MHz, 24MHz, 28MHz and 50MHz)

KE9V's impetus to mention this unit was from a pragmatic mention by Bill Nangle VE3FI on his blog:

> I haven't dabbled with WSPR for a few years now, but on the advice of Kieran VA3KS (SK) I decided to buy a Zachtek WSPR Desktop Transmitter. It's a nice piece of gear, and it took no time at all to get it on the air.
>
> My plan is to use WSPR instead of APRS on my Western Canada trip next spring. I find APRS set up to be a real pain in the behind, but I can set up the WSPR each evening from my camp and the guys back home can see where I am that day.

If You Want to Support (or Interested in) Low Power (QRP) Operation…

Pseudostaffer Jeff Davis KE9V offers these suggestions for joining two organizations that publish newsletters specializing in low power (QRP) operation:

> QRP-ARCI has decided to **maintain current membership rates**. Accordingly, there will be no change in the membership/subscription fee for 2024. It will remain the same as it has been for OVER ten years. Join or renew here.
>
> Now is the time to **renew your GQRP membership** if you want to keep SPRAT coming. SPRAT is a quarterly magazine which contains many circuits, technical hints and ideas for QRP construction projects, together with club news, contest and award information and other items of interest to QRP operators. Join or renew here.

QRP-ARCI's QRP Quarterly and GQRP's SPRAT both seem to be Zero Retries Interesting (reasonable technical detail / construction) publications, but both organizations jealously guard their publications behind a paywall, so if you're merely curious about the publication, you have to "pay up" *first*.

My perspective is that low power operation (QRP) used to be a niche activity in Amateur Radio, requiring substantial skill in selecting operating frequencies, times, etc. for making contacts. In recent years, advanced new data modes such as FT8 and WSPR have made low power operations more accessible to many because (again, personal perspective…) operating low power using advanced new data modes isn't as frustrating and exacting as low power operation using analog modes. For example, the ZachTech WSPR Desktop Transmitter mentioned above could be used with a minimalist antenna even in an apartment. It's a thrill to see that *your* radio signal, minimal though it is, is being received elsewhere in the world… *from your apartment*.

Leave a comment

Share

Updata

Short updates from immediately previous issues.

Amateur Radio Weekly Issue 309 had a couple of stories that that provide additional context to stories in **Zero Retries 0127**:

- **European Space Agency GEO satellite opportunity**
  Footprint could cover portions of Canada and USA.
  AMSAT-DL

- **Promising news for the Amateur Radio 23cm microwave allocation**
  It looked as if the decades old allocation might be lost altogether.
  EI7GL

ARRL provided additional context on the future of the 23cm Band (1240 - 1300 MHz):

- **WRC-23 Reaches Acceptable Conclusion on 23-centimeter Issue**

Feedback Loop

Zero Retries 0127 Comments

As I mentioned in Request To Send, **Zero Retries 0127** received the most comments of any issue to date - ***19!***

My Thanks to commenters Steven Davidson, Alexander DL4NO, AF7SJ - Bill, and Tristan for rousing and interactive followup conversations for subjects discussed in **Zero Retries 0127**.

Zero Retries 0128 Comments

My Thanks to commenter Ria Jairam N2RJ. I especially appreciate K4HCK - Cale's comment:

> Steve, I finally carved out some time to listen to your QSO Today interview and wanted to call out the enthusiasm you expressed for the hobby throughout the podcast. It was a welcome injection of excitement that I needed! It's easy to get burned out on all things Ham when scanning headlines several days a week. Thanks for the boost!

For context, K4HCK is publisher of a group of online publications (The *Ham Weekly Network*) - Amateur Radio Weekly (the first thing that *I* read upon on Saturday mornings), Amateur Radio Daily, and his newest project, NetFinder. Thus, I get it when he says "It's easy to get burned out on all things Ham…" as there are moments (fortunately, brief) when I feel the same way. So providing that boost to K4HCK for him to continue with his various projects was a good feeling.

If you provide feedback via email, I may excerpt your feedback or include it in full. Unless you specifically grant me permission to include your name, I won't do so. Feedback may be lightly edited for clarity.

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*

- ***Founding Members* who generously support Zero Retries financially:**
  Founding Member 0000 - Steven Davidson K3FZT
  Founding Member 0001 - Prefers to Remain Anonymous 01

  Founding Member 0002 - Chris Osburn KD7DVD
  Founding Member 0003 - Don Rotolo N2IRZ
  Founding Member 0004 - William Arcand W1WRA
  Founding Member 0005 - Ben Kuhn KU0HN
  Founding Member 0006 - Todd Willey KQ4FID
  Founding Member 0007 - Merik Karman VK2MKZ
  Founding Member 0008 - Prefers to Remain Anonymous 14

- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

Want to Support Zero Retries?

- The *most* effective way to support Zero Retries is to simply mention Zero Retries to your co-conspirators that are also interested in knowing more about technological innovation that is occurring in Amateur Radio and encourage them to become a fellow subscriber.
- One particularly effective method of promoting Zero Retries is to add a mention of Zero Retries to your QRZ page (or other web presence) and include a link:

  https://www.zeroretries.org

- If you'd like to financially support Zero Retries, becoming a paid subscriber is *greatly* appreciated and helps offset expenses incurred in publishing Zero Retries. Paid subscriptions for Zero Retries are *entirely optional*, as explained in this special issue of ZR:
  Zero Retries Administrivia - Activating Payment Options.

These blogs and newsletters regularly feature Zero Retries Interesting content:

- Dan Romanchik KB6NU mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.
- Jeff Davis KE9V also mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.
- Amateur Radio Weekly by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.
- Experimental Radio News by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC. It's a *must-read-now* for me!
- RTL-SDR Blog - *Excellent* coverage of Software Defined Radio units.
- TAPR Packet Status Register has been published continuously since 1982.
- Other Substack Amateur Radio newsletters recommended by Zero Retries.

These YouTube channels regularly feature Zero Retries Interesting content:

- HB9BLA Wireless by Andreas Spiess HB9BLA
- KM6LYW Radio by Craig Lamparter KM6LYW (home of the DigiPi project)
- Modern Ham by Billy Penley KN4MKB
- Tech Minds by Matthew Miller M0DQW

Zero Retries is currently using the Substack email publishing platform to publish Zero Retries. It's particularly suitable for small newsletters as you can get started for no cost.

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click below to join ***1100+*** other subscribers:

Subscribe now

Please tell your co-conspirators about Zero Retries — just click:

Share Zero Retries

Offering **feedback or comments** for Zero Retries is equally easy — just click:

Leave a comment

If you're a fellow smart person that uses **RSS**, there *is* an **RSS feed for Zero Retries**.

Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

Zero Retries / N8GNJ on Mastodon

Email issues of Zero Retries are "instrumented" by Substack to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- SuperPacket blog — *Discussing new generations of Amateur Radio Data Communications — beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs — Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA, and linked to the Internet via **Starlink *Satellite* Internet Access**.

2023-12-15

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Blanket permission granted for TAPR to use any Steve Stroh content for the TAPR Packet Status Register (PSR) newsletter (I *owe* them from *way* back).

[1]

This link was the most recent version I could find with a web search.

[2]

I received my SMT NinoTNC and it's a real work of electronic art - and deceptively tiny - *no wasted space*. I'm looking forward to spinning up a Raspberry Pi for it, and I probably need to get another one on order.